

THE MICROCADDISFLY GENUS *ITHYTRICHIA* EATON (TRICHOPTERA: HYDROPTILIDAE) IN NORTH AMERICA

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Abstract.—The distribution and taxonomy of the microcaddisfly genus *Ithytrichia* Eaton in North America is reviewed. Males and females of *I. clavata* Morton, *I. mazon* Ross, and *I. mexicana* Harris and Contreras-Ramos are illustrated, and a key is provided for their separation. Females of *I. mazon* and *I. mexicana* are described for the first time; the female of *I. clavata* is redescribed.

Key Words: Trichoptera, Hydroptilidae, *Ithytrichia*, taxonomy, nearctic distribution

The holarctic genus *Ithytrichia* (Eaton 1873) is a small group of microcaddisflies with six species worldwide (Marshall 1979, Morse 1993) belonging to the subfamily Hydroptilinae, tribe Orthotrichiini. Three species, *I. clavata* Morton, *I. mazon* Ross, and *I. mexicana* Harris and Contreras-Ramos, are found in North America (Morse 1993). Adults are distinguished from those of other nearctic hydroptilid genera by the presence of ocelli, a 0-3-4 tibial spur count, mesoscutellum without transverse suture, and posterodorsal margin of mesoscutellum separated from posterior margin by a narrow strap (Moulton and Stewart 1996). The laterally compressed abdomen having dorsal and ventral membranous lobes easily identifies larvae of *Ithytrichia*; the larval case is composed entirely of silk and is purse-like with a small circular anterior opening (Wiggins 1996). Morphological characters have not been discovered to distinguish the larvae to species. Before this study, only the female of *I. clavata* was known. In this paper, we describe for the first time the females of *I. mazon* and *I. mexicana*. Males of the three species are

reillustrated with accompanying distributional notes. Keys for separating males and females of the three North American species are also provided.

Material examined in this study is deposited at the Arkansas State University Museum of Zoology, Jonesboro (ASUMZ), the California Academy of Sciences, San Francisco (CAS), the C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins (CSU), the Illinois Natural History Survey, Champaign (INHS), the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (NMNH), the Ohio Biological Survey, Columbus (OBS), the University of Minnesota, St. Paul (UM), the University of North Texas, Denton (UNT), and in the research collection of the senior author (SRM). Although most specific characters may be discerned by using a dissecting microscope (60–100×), it is necessary to view some of the female genitalic characters (e.g., spermathecal sclerite) by using a compound microscope (100–400×). Morphological terminology follows that of Marshall (1979). Length is measured from the tip of the head to the posterior tip of the forewings.

Ithytrichia clavata Morton

(Figs. 1, 4, 7)

Ithytrichia clavata Morton 1905:67.

Ross (1944) described the female of *I. clavata*, however, the discovery of the females of *I. mazon* and *I. mexicana* necessitates a redescription for comparison.

Female description.—Length 2.9–3.5 mm. 21 antennal segments. Light brown in alcohol. Sternite VI with short acute ventromesal process. Sternite VII in ventral view dome-shaped. Sternite VIII in ventral view parallel-sided, posterior margin with series of stout setae, each arising from a membranous tubercle; ventral sclerite widening posteriorly, posterior margin with broad concavity, bi-lobed, each lobe with a membranous pocket; two pairs of lateral apodemes. Segment IX bullet-shaped in ventral view; one pair of lateral apodemes. Segment X button-like with a pair of short cerci. Apodemes slender and rod-like, one pair extending from anterior end of segment X apodemes, other pair from anterior edge of segment VIII, both pairs extending to segment VI, with anterior apices gently curving mesad. Spermathecal sclerite in ventral view with anterior membranous and circular; basal one-third sclerotized on lateral margins, anterior apices angled laterad, gradually tapering posteriorly to pointed, incurved apices, middle portion of sclerotized apparatus arrowhead-shaped; posterior two-thirds widest at base, narrowing in middle to tubular apex, middle portion with lateral patches of minute spines.

Material examined.—USA: CALIFORNIA, Colusa Co., Bear Creek, 26 km E Clearlake Highlands, 28-VII-1974, P. Peterson, 6 ♂ (CAS); Lake Co., elev. 402 m, 16-IX-1949, H. P. Chandler, 1 ♂ (CAS); Napa Co., Capell Cr., 7-VI-1952, 1 ♂ (CAS); Big Canyon Creek, 13 km NE Middletown, 23-VI-1974, P. Peterson, 1 ♂ (CAS); FLORIDA, Jackson Co., Florida Caverns State Park, 4-V-1970, 2 ♂ (NMNH); ILLINOIS, Galena River, Council Hill, 26-VI-1940, Mohr and Riegel, 10 ♂ (INHS); MAINE,

Ashland, 29-VII-1924, 1 ♂ (CAS); Orono, Lake Pushaw, 1-3-VIII-1966, W. W. Wirth, 3 ♂ (NMNH); Oxbow (T9R5), 22-VII-1961, A. Brower, 2 ♂ (NMNH); Allagash, 29-VII-1959, 32 ♂ (NMNH); same but, 30-VII-1959, 130 ♂ (NMNH); same but, 5-VIII-1959, 8 ♂ (NMNH); MISSOURI, Gasconade Co., Gasconade River, Held's Island Access, 28-VIII-1990, B. C. Poulton, 3 ♂ (UNT); Maries Co., Gasconade River, Island Ford Resort @ Hwy 42, 7-VIII, 1990, B. C. Poulton, 1 ♂ (UNT); same but, Paydown Access, SW Belle, 15-VII-1990, 1 ♂ (UNT); Osage Co., Gasconade River, Hwy 89 @ Dallas Ferry Access, 27-IX-1990, B. C. Poulton, 2 ♂ (UNT); PENNSYLVANIA, Presque Isle, 15-VIII-1947, 1 ♂ (CAS); Chemung River, Athens, 8-VII-1937, J. Eddleston, 23 ♂ (INHS); TEXAS, Brewster Co., county park, 8 km S Marathon, 22-VI-1994, B. Kondratieff, 5 ♂, (CSU); Edwards Co., South Llano River @ Paint Rock Springs, Hwy 337, 12-VI-1992, B. Kondratieff, 1 ♂ (CSU); Hays Co., Blanco River @ Post Rd., 14-V-1991, S. Tie-mann, 3 ♂ (UNT); Palo Pinto Co., Brazos River, TX Hwy 4, 23-III-1972, Stark and Rhame, 1 ♂, 1 ♀ (NMNH), same but, 6-VI-1995, D. C. Houghton, 27 ♂, 59 ♀ (UNT); Randall Co., Prairie Dog Town Fork of Red River, Palo Duro Canyon State Park, water crossing No. 5, 12-IX-1997, S. R. Moulton and G. W. Easley, 2 ♂, 1 ♀ (SRM); WISCONSIN, Door Co., Egg Harbor, 13-VIII-1940, C. O. Mohr, 21 ♂, 15 ♀ (INHS); same but, Ephraim, WI, ?-?-1957, 1 ♀ (INHS); CANADA: MANITOBA, Lake Manitoba, 5 km W Delta, 3-VIII-1967, D. Webb, 9 ♂ (INHS); QUEBEC, Ottawa River, Quyon, 1-VIII-1976, O. S. Flint, Jr., 4 ♂, 1 ♀ (NMNH); Norway Bay, 4-VIII-1973, O. S. Flint, Jr., 4 ♂, 4 ♀ (NMNH).

Discussion.—*Ithytrichia clavata* has a holarctic distribution (Fischer 1961); it is widely distributed throughout the United States and southern Canada (Wiggins and Parker 1997). Houghton and Stewart (1998) reported on the seasonal flight periodicity

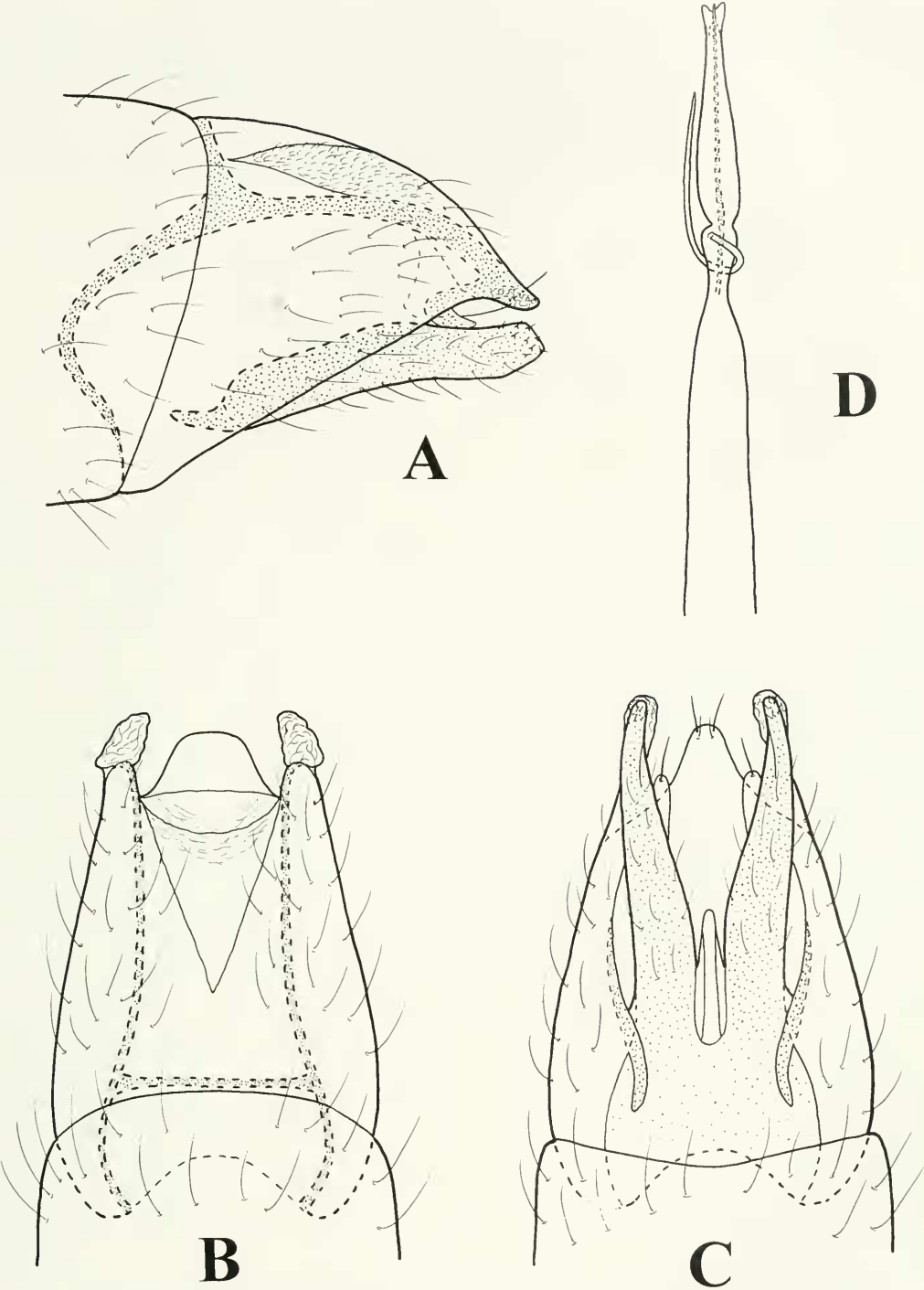


Fig. 1. *Ithytrichia clavata*, male genitalia. A, Left lateral. B, Dorsal. C, Ventral. D, Phallus.

of *I. clavata* from the Brazos River in north-central Texas. Specimens of *I. clavata* from the eastern United States determined before 1944 should be checked to ensure they are not misidentifications of *I. mazon*. We found this to be true in some of the material we examined.

Ithytrichia mazon Ross
(Figs. 2, 5, 8)

Ithytrichia mazon Ross 1944:124.

Female description.—Length 3.3–4.0 mm. 21 antennal segments. Light brown in alcohol. Sternite VI with short acute ventro-mesal process. Sternite VII in ventral view dome-shaped. Sternite VIII in ventral view parallel-sided, posterior margin with series of stout setae, each arising from a membranous tubercle; ventral sclerite widening posteriorly, apex truncate. Segment IX bullet-shaped in ventral view, apex membranous. Segment X button-like with a pair of short cerci. Apodemes slender and rod-like, one pair extending from anterior end of segment X apodemes, other pair from anterior edge of segment VIII, both pairs extending to segment VI, with anterior apices gently curving laterad. Spermathecal sclerite in ventral view with anterior a membranous funnel-shape; basal one-third sclerotized laterally and bowed, middle portion of sclerotized apparatus arrowhead-shaped; posterior two-thirds widest at base, narrowing in middle to tubular apex, middle portion with lateral patches of minute spines.

Material examined.—USA: ARKANSAS, Logan Co., Sixmile Creek, 23-V-1986, H. W. Robison, 1 ♂ (INHS); ILLINOIS, Mazon, along Mazon Creek, 16-VI-1938, B. D. Burks, holotype ♂ (INHS); SERENA, Indian Creek, 16-VI-1939, B. D. Burks, 1 ♂ (INHS); OHIO, Adams Co., Hills Fork-Eagle Creek, SR 125, W West Union, OH, 27-VI-1993, B. Armitage, UV trap, 37 ♂, 52 ♀ (OBS); OKLAHOMA, Latimer Co., 10-VI-1931, R. D. Bird, 3 ♂, 3 ♀ (1 vial each sex, INHS).

Discussion.—This species appears to be

restricted to small streams in the Ohio and middle Mississippi River drainages. New state records are presented here for Ohio and Oklahoma. In addition to the states listed above, *I. mazon* has also been recorded from the Salt River drainage, Spencer Co., Kentucky (Resh 1975).

Ithytrichia mexicana Harris and
Contreras-Ramos
(Figs. 3, 6, 9)

Ithytrichia mexicana Harris and Contreras-Ramos 1989:176.

Female description.—Length 3.5 mm. 20 antennal segments. Brown in alcohol. Sternite VI with short acute ventro-mesal process. Sternite VII in ventral view subrectangular. Sternite VIII in ventral view parallel-sided, posterior margin with series of stout setae, each arising from a membranous tubercle; ventral sclerite with anterolateral flaps, each bearing a series of short setae, narrowing to truncate posterior margin, posterior margin with a short mesal process. Segment IX bullet-shaped in ventral view. Segment X button-like with a pair of short cerci. Apodemes slender, rod-like, extending from segment IX to VII, anterior apices straight, second pair of lateral apodemes branching from mesal pair at approximately the anterior margin of segment VIII. Spermathecal sclerite in ventral view with anterior portion forming a funnel-shaped collar constricted in middle; basal one-half sclerotized laterally with anterior apices acutely produced mesad, gradually tapering posteriorly to pointed, incurved apices, middle portion of sclerotized apparatus arrowhead-shaped; posterior one-half widest at base with lateral patches of minute spines, narrowing in middle to tubular apex, middle portion with short mesal incision; anterior and posterior portions joining with lateral membranous lobes.

Material examined.—USA: ARIZONA, Coconino Co., Oak Creek at Sterling Spring Fish Hatchery, U.S. Hwy 89A, elev. 1,829 m, 4-5-VI-1993, S. Moulton and K. Alex-

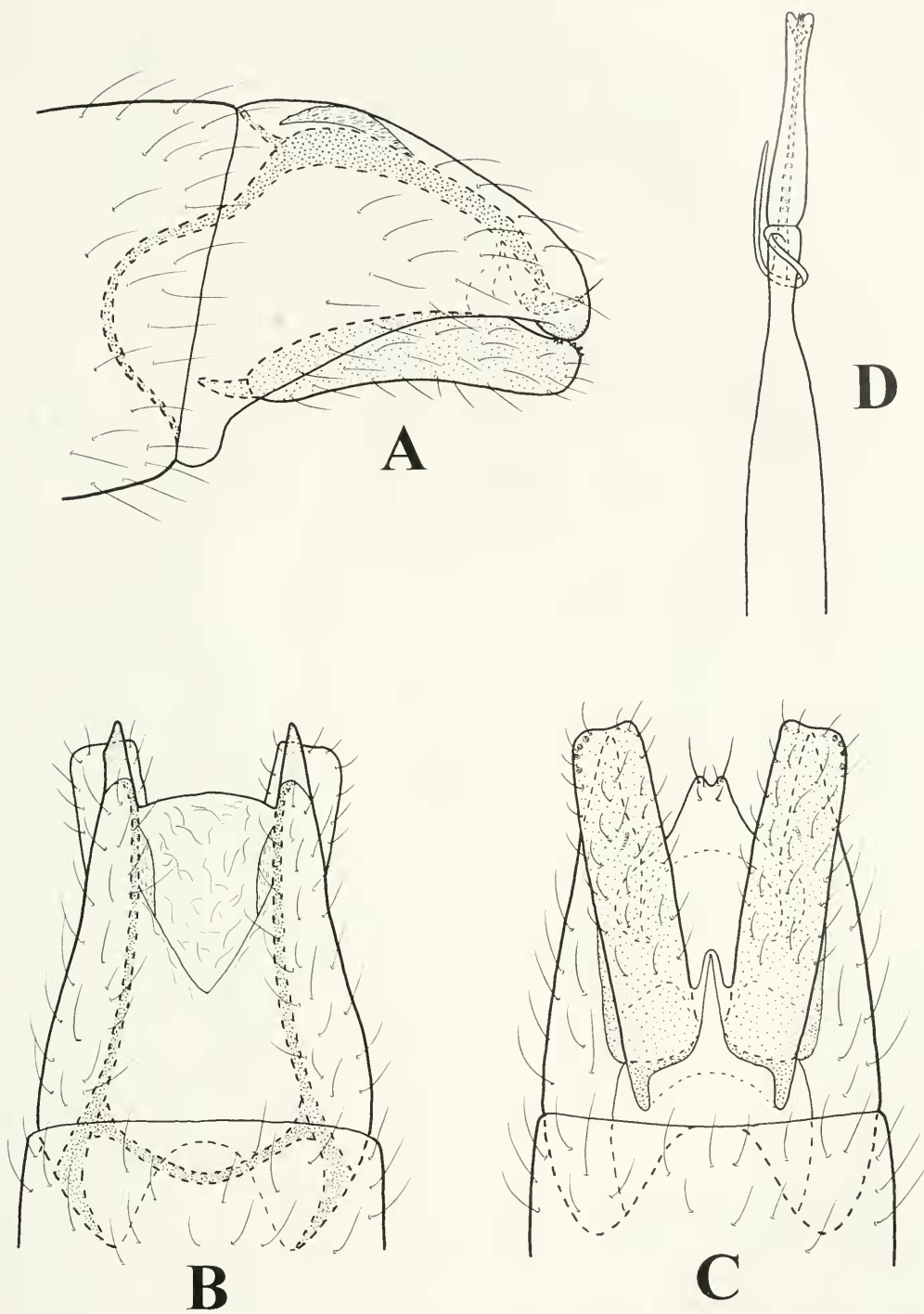


Fig. 2. *Ithytrichia mazon*, male genitalia. A, Left lateral. B, Dorsal. C, Ventral. D, Phallus.

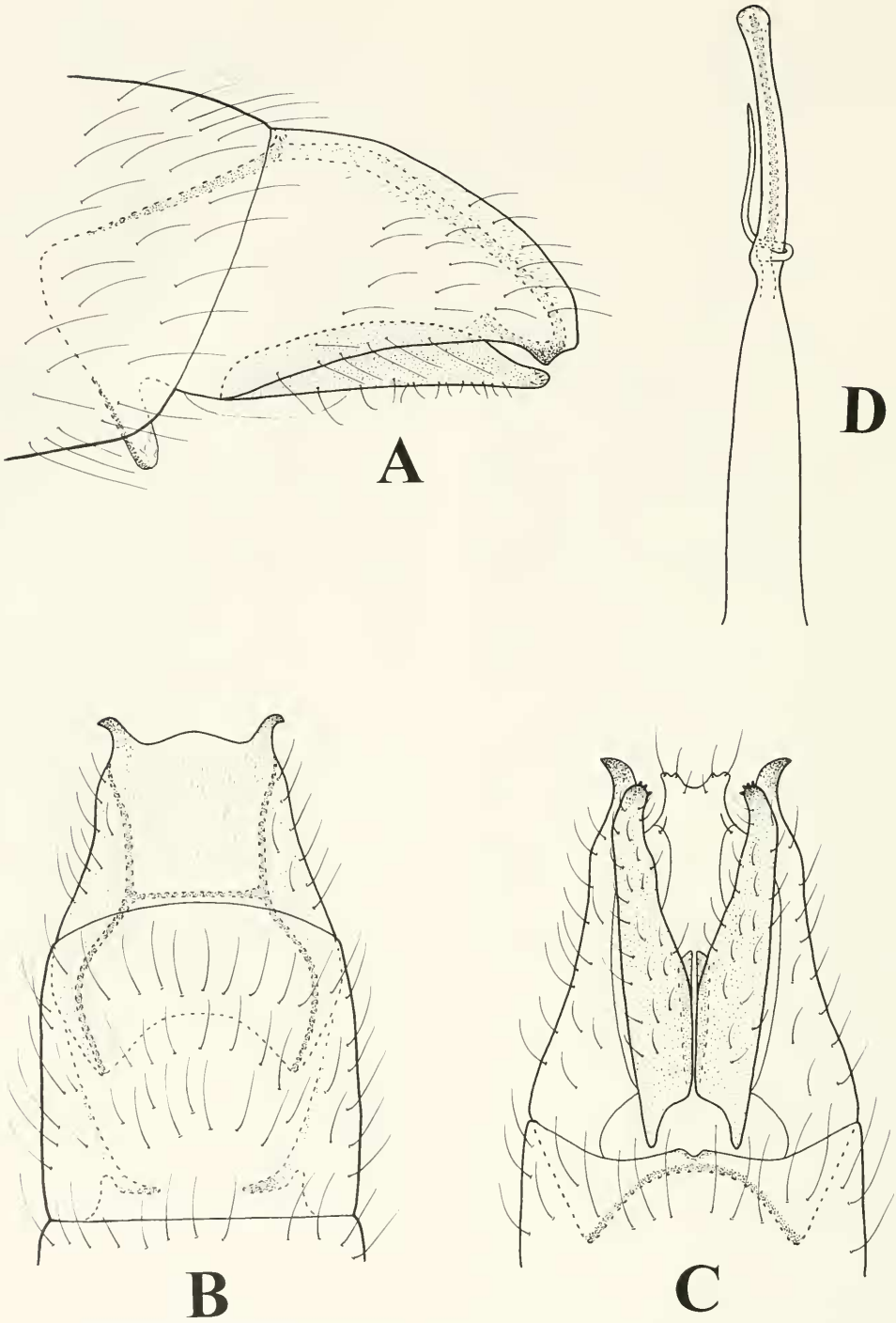
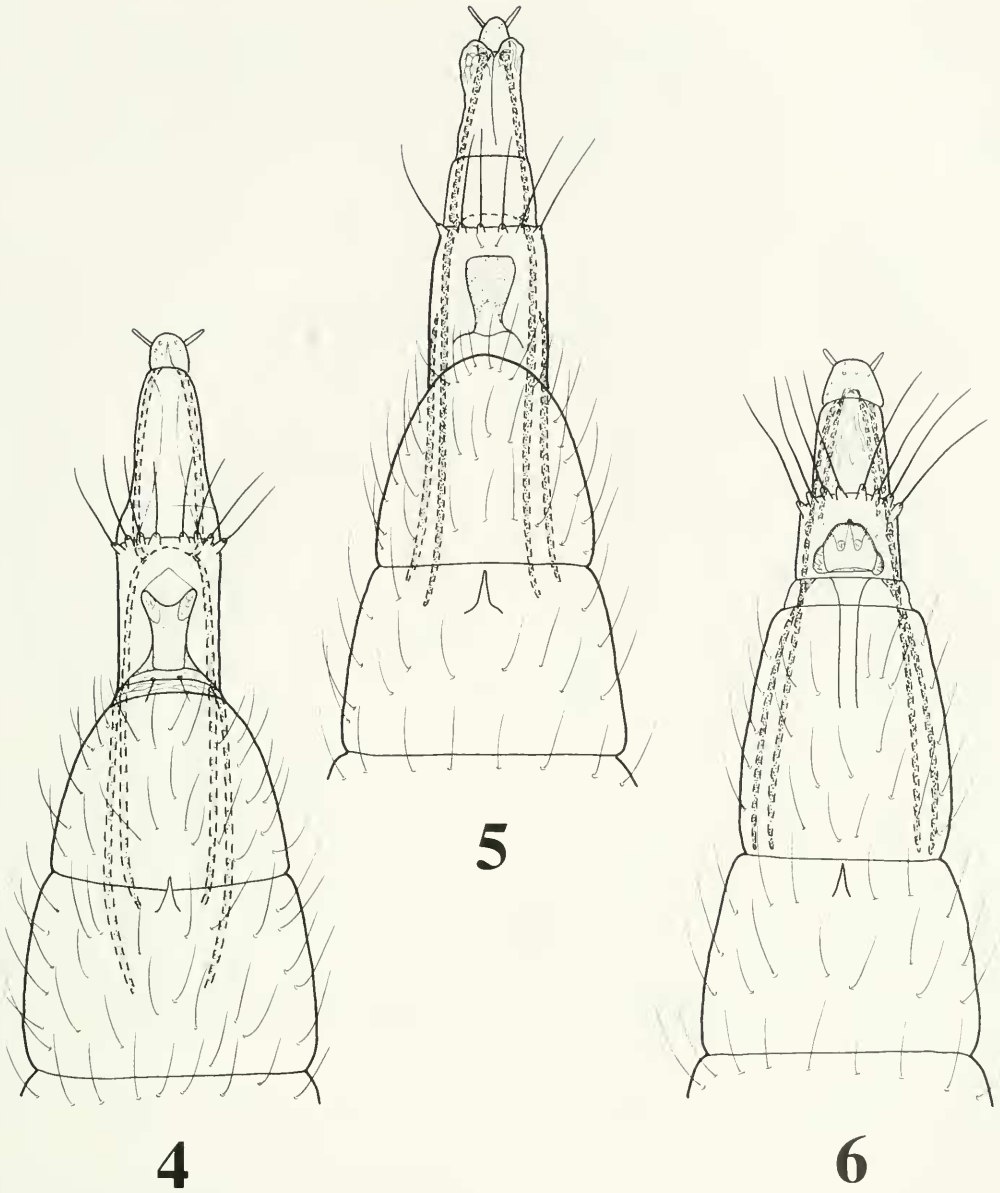


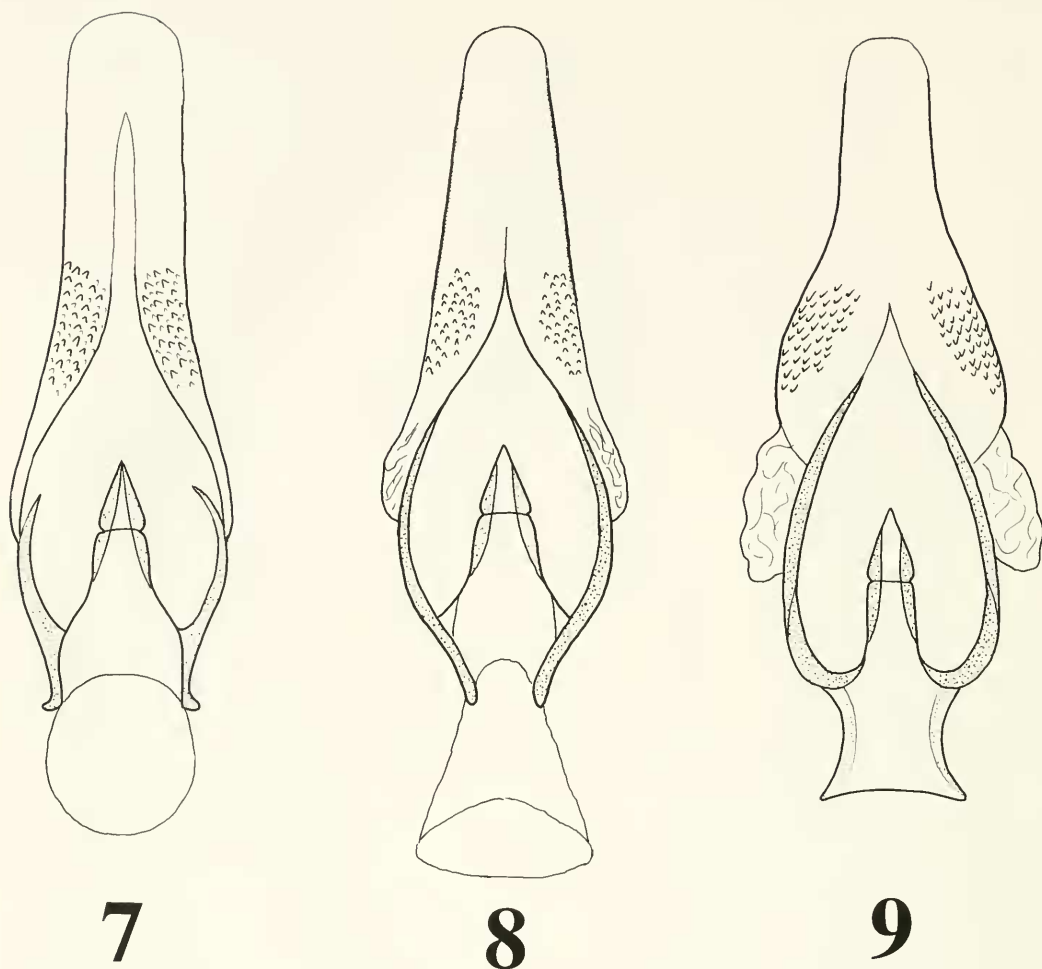
Fig. 3. *Ithytrichia mexicana*, male genitalia. A, Left lateral. B, Dorsal. C, Ventral. D, Phallus.



Figs. 4–6. *Ithytrichia* female genitalia, ventral. 4, *I. clavata*. 5, *I. mazon*. 6, *I. mexicana*.

ander, 2 ♂ (UM); NEW MEXICO, Sandoval Co., Rito de los Frijoles @ Bandelier National Monument, 10.4 km S Los Alamos, elev. 1,839 m, 2-VIII-1994, L. F. Carter, 1 ♂ (INHS), same but 1-3-VIII-1997, J. Slusark and B. Richards, UV trap, 1 ♀ (NMNH). MEXICO: TAMAULIPAS, Municipio de Gomez Farias, Rio Frio @ headwaters, La Poza Azul, 6 km S Gomez

Farias, 7-VIII-1988, A. Contreras and A. Moreno, blacklight, holotype ♂ (NMNH). Discussion.—This species was originally described by Harris and Contreras-Ramos (1989) based on a single male collected from the headwaters of the Rio Frio, Tamaulipas, Mexico. The Arizona record listed above was erroneously reported as a new Arizona state record for *I. clavata* by Moul-



Figs. 7-9. *Ithytrichia* spermathecal sclerites, ventral. 7, *I. clavata*. 8, *I. mazon*. 9, *I. mexicana*.

ton et al. (1994). *Ithytrichia mexicana* is reported herein from the United States for the first time and the species is now represented by a total of five specimens (4 males, 1 female). On the basis of known collection records, it appears to have an affinity for small cold mountain streams in the southwestern United States and northern Mexico at about 1,800 m in elevation.

Undetermined *Ithytrichia* Material

We examined several larvae and pupae in this study that could not be positively determined to species. However, speculation as to their probable identity is indicated

in brackets for a few records based on distributional information.

Material examined.—ARIZONA, Gila Co., Christopher Creek, AZ 260, ca. 40 km NE Payson, elev. 1,792 m, 14-VII-1985, A. R. Brigham, 2 larvae (INHS) [*I. mexicana*]; Christopher Creek, ?-?-1985, A. Brigham, 8 larvae (INHS) [*I. mexicana*]; Lower Horton Creek, 12-VIII-1937, Tazwell, 1 larva (INHS); ARKANSAS, Randolph Co., Jane's Creek, AR Hwy 90, S Ravenden Springs, III-1985, S. R. Moulton, 1 larva (ASUMZ); MAINE, Washington Co., Narraguagus River, island, 6-VII-1973, T. Mingo, 2 pupae, 5 larvae (NMNH) [*I. clavata*];

TEXAS, Pecos River, Sheffield, 6-I-1976, J. Davis, 6 larvae (NMNH) [*I. clavata*]; WISCONSIN, Madison, Fox River, Lake Winnebago, ?-?-1954, K. M. Mackenthun, 1 larva (INHS) [*I. clavata*].

Key to the North American
Species of *Ithytrichia*

- 1. Male (Figs. 1-3) 2
- Female (Figs. 4-6) 4
- 2. Inferior appendages in ventral view tapering posterad, apices rounded (Figs. 1C, 3C) 3
- Inferior appendages in ventral view rectangular, apices truncate (Fig. 2C) *I. mazon*
- 3. Posterolateral margins of tergum IX sclerotized, hooked laterad (Fig. 3B); apex of subgenital plate emarginate (Fig. 3C) *I. mexicana*
- Posterolateral margins of tergum IX rounded, not hooked (Fig. 1B); apex of subgenital plate dome-shaped (Fig. 1C) *I. clavata*
- 4. Ventral sclerite of VIII gradually widening posteriorly (Figs. 4, 5); lateral sclerites of spermathecal sclerite less than one-half length of entire apparatus, ending anterolaterally in angled or rounded apices (Figs. 7, 8) 5
- Ventral sclerite of VIII narrowing posteriorly (Fig. 6); lateral sclerites of spermathecal sclerite about one-half length of entire apparatus, anterior apices curving inward to join arrowhead-shaped mesal process (Fig. 9) *I. mexicana*
- 5. Ventral sclerite of VIII with concave posterior margin (Fig. 4); lateral processes of spermathecal sclerite short, anterolaterally angled outward (Fig. 7) *I. clavata*
- Ventral sclerite of VIII with truncated posterior margin (Fig. 5); lateral processes of spermathecal sclerite elongate, rounded anteriorly (Fig. 8) *I. mazon*

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LITERATURE CITED

Eaton, A. E. 1873. On the Hydroptilidae, a family of the Trichoptera. Transactions of the Entomological Society of London 1873: 125-150.

Fischer, F. C. J. 1961. *Trichopterorum Catalogus* Vol. II: Philopotamidae, Hydroptilidae, Stenopsychidae. iv + 190 pp. Amsterdam.

Harris, S. C. and A. Contreras-Ramos. 1989. *Ithytrichia mexicana* (Trichoptera: Hydroptilidae), a new species of caddisfly from Mexico. Entomological News 100: 176-178.

Houghton, D. C. and K. W. Stewart. 1998. Seasonal flight periodicities of six microcaddisflies (Trichoptera: Hydroptilidae, Glossosomatidae) in the Brazos River, Texas, with notes on larval biology and site records. Entomological News 109: 103-109.

Marshall, J. E. 1979. A review of the genera of the Hydroptilidae (Trichoptera). Bulletin of the British Museum of Natural History (Entomology) 39: 135-239.

Morse, J. C. 1993. A checklist of the Trichoptera of North America, including Greenland and Mexico. Transactions of the American Entomological Society 119: 47-93.

Morton, K. J. 1905. New American Hydroptilidae. New York State Museum Bulletin 86: 63-85.

Moulton, S. R., II, K. W. Stewart, and K. L. Young. 1994. New records, distribution, and taxonomic status of some northern Arizona caddisflies (Trichoptera). Entomological News 105: 164-174.

Moulton, S. R., II and K. W. Stewart. 1996. Caddisflies (Trichoptera) of the Interior Highlands of North America. Memoirs of the American Entomological Institute Vol. 56, 313 pp.

Resh, V. H. 1975. A distributional study of the caddisflies of Kentucky. Transactions of the Kentucky Academy of Science 36: 6-16.

Ross, H. H. 1944. The caddisflies, or Trichoptera, of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

Wiggins, G. B. 1996. Larvae of the North American caddisfly genera (Trichoptera). 2nd Edition. University of Toronto Press, Toronto. 457 pp.

Wiggins, G. B. and C. R. Parker. 1997. Caddisflies (Trichoptera) of the Yukon, with analysis of the Beringian and holarctic species of North America. pp. 787-866. In Danks, H. V. and J. A. Downes, eds., Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods), Ottawa. 1034 pp.